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POISSONIA LONGIFEMORATA, A NEW GENUS AND SPECIES OF GIANT WATER-BUG (HEMIPTERA, BELOSTOMATIDAE), AND A NEW VARIETY IN THE ALLIED GENUS *HYDROCYRIUS* SPINOLA.

By E. S. Brown, B.A., F.R.E.S.

My attention was called by Dr. W. E. China, of the British Museum (Natural History), to a pair of Giant Water-bugs in the collection of the British Museum, which appeared to belong to an undescribed genus. Among specimens of *Hydrocyrius* Spinola, to which the new genus was clearly allied, a specimen was discovered standing over the name *H. colombiae* Spinola which did not belong to that species, since it had the front tarsal claws of equal length, which allies it to *H. rectus* Mayr: a detailed examination indicated the advisability of describing it provisionally as a form of that species. Accordingly there follows a description, first of the new genus and species, and secondly of the new form of *H. rectus*.

Poissonia gen. n.

Allied to *Hydrocyrius* Spinola (1850), from which it differs mainly in the greater length of the front legs; the anterior femora are longer than the hind femora and almost straight-sided (fig. 1*a*), and the anterior tibiae are longer than the middle tibiae; the length of thorax and abdomen combined is less than $2\frac{1}{2}$ times that of the anterior femora.

Head with a pronounced longitudinal furrow on each side. Eye narrow, approximately 5 times as long as broad. Antennae 4-segmented, the 2nd and 3rd segments with lateral lobes which do not reach the tip of the terminal segment (fig. 3, *e* and *f*).

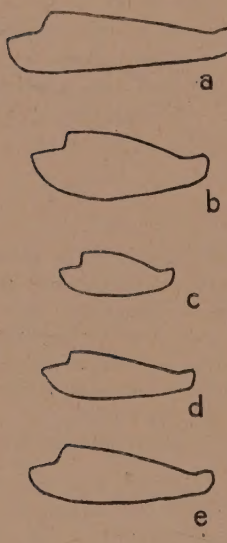
Male genitalia (fig. 2) much as in *Hydrocyrius*; terminal lobe of aedeagus flattened and spatulate; styles curved and tapered as in *Hydrocyrius*.

Anterior tarsus with two claws of equal length.

The main differences between *Poissonia* and *Hydrocyrius* are summed up in the following table:

Poissonia gen. n.	*Hydrocyrius* Spinola.
1. Greatest width of pronotum equal to, or less than, length of head and pronotum combined.	1. Greatest width of pronotum greater than length of head and pronotum combined.
2. Front femur longer than hind femur, almost straight-sided and more than 4 times as long as its greatest width (fig. 1*a*).	2. Front femur shorter than hind femur, with margins more or less convexly curved, and considerably less than 4 times as long as broad (fig. 1, *b–e*).
3. Length of pronotum and elytra combined less than $2\frac{1}{2}$ times the length of the front femur.	3. Length of pronotum and elytra combined greater than $2\frac{1}{2}$ times the length of the front femur.

Poissonia gen. n.	*Hydrocyrius* Spinola.
4. Front tibia longer than middle tibia, its outer margin straight.	4. Front tibia shorter than middle tibia, its outer margin convexly curved (almost straight in *H. rectus*).
5. Anterior claws equal.	5. Anterior claws equal or unequal.
6. Eyes narrow, about 5 times as long as broad, viewed from above.	6. Eyes broader, about 2–3 times as long as broad.
7. Lateral lobes of 2nd and 3rd antennal segments not extending as far as the tip of the terminal segment (fig. 3, *e–f*).	7. Lateral lobes of 2nd and 3rd antennal segments very long, extending as far as the tip of the terminal segment, or almost so (fig. 3, *a–d*).



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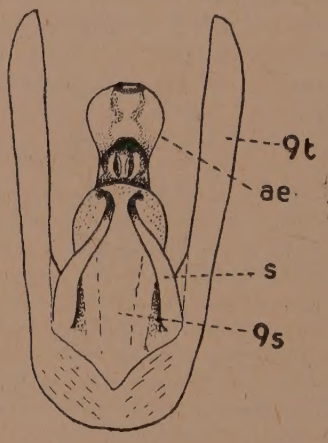

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Fig. 1.—Left front femur, from below: (*a*) *Poissonia longifemorata*; (*b*) *Hydrocyrius colombiae*; (*c*) *H. nanus*; (*d*) *H. rectus*; (*e*) *H. rectus* form *major*. × 1⅓.

Fig. 2.—9th abdominal segment of *Poissonia longifemorata*, ventral view; *9t*, processes of 9th tergite; *9s*, 9th sternite; *s*, style; *ae*, aedeagus. × 4⅔.

The new genus appears to differ only in degree of certain characters from *Hydrocyrius*, and in some characters indeed it forms the end of a graded series when compared with different species of that genus; this is shown in certain features involving relative measurement, as can be seen by reference to Table I.

It is therefore possible that the discovery of intermediate forms may enable the relative importance of different characters to be better appreciated, and necessitate a re-grouping of the species of the two genera.

TABLE I.—*Some Measurements and Ratios for* Poissonia longifemorata *and Species of* Hydrocyrius.

	Thorax + abdomen : front femur.		Front femur, length : max. width.	
	Actual length (in mm.).	Ratio.	Actual (in mm.).	Ratio.
H. colombiae	59 : 17·5	3·37 : 1	17·5 : 6·5	2·7 : 1
H. nanus	37 : 11·0	3·36 : 1	11·0 : 4·0	2·75 : 1
H. rectus	43 : 15·0	2·87 : 1	15·0 : 5·0	3·0 : 1
H. rectus form *major* . .	53 : 18·5	2·87 : 1	18·5 : 6·0	3·08 : 1
P. longifemorata, ♂ . . .	49 : 23·0	2·13 : 1	23·0 : 5·5	4·2 : 1
Ditto, ♀	54 : 24·0	2·25 : 1	24·0 : 5·6	4·3 : 1

	Front femur : hind femur. Actual (in mm.).	Thorax, max. width : length.		Eye, width : length. Ratio.
		Actual (in mm.).	Ratio.	
H. colombiae . . .	17·5 : 20·0	22·5 : 12·0	1·87 : 1	55 : 140
H. nanus	11·0 : 13·5	13·5 : 8·0	1·69 : 1	40 : 94
H. rectus	15·0 : 17·0	15·5 : 9·5	1·63 : 1	40 : 115
H. rectus form *major* . .	18·5 : 20·0	19·5 : 10·5	1·86 : 1	52 : 135
P. longifemorata, ♂ . .	23·0 : 20·5	18·5 : 11·0	1·69 : 1	25 : 133
Ditto, ♀	24·0 : 21·0	19·0 : 11·0	1·73 : 1	30 : 145

Genotype *Poissonia longifemorata* sp. n.

The genus is named after Mons. R. Poisson of the Faculté des Sciences, Rennes, in recognition of his extensive work on aquatic Hemiptera.

Poissonia longifemorata sp. n.

General appearance (Plate I) as in *Hydrocyrius*, but differs more or less distinctly from the different species of that genus in the characters stated in the generic description, the chief being the great length of the legs (especially the front ones), and the narrowness of the pronotum and the eyes.

The sexes are alike, except in width of eyes, form of antennae and slight difference in colour, and the following description applies to both sexes unless otherwise stated.

Colour.—Medium brown, much as in *Hydrocyrius rectus*, but with a distinct yellowish tinge, which is most conspicuous on the head and pronotum of the male.

Head.—Vertex with a well-defined, median, longitudinal ridge, on each side of which is a furrow bordered with rather long hairs, especially on the inner slope. Eyes narrow ; in the male black, width to length 25 : 133 ; in the female grey-brown, width to length 30 : 145. Antennae with 2nd and 3rd segments each with an external process (fig. 3, *e* and *f*) ; these processes are longer in the male than in the female, but in neither sex are they as long as in any species of *Hydrocyrius* (fig. 3, *a–d*), and they are more pointed than in that genus ; it is probable that the shape and size of these processes will prove variable if more specimens are discovered, and the character should not be relied on.

Pronotum.—Length greater, in comparison to the width, than in *Hydrocyrius colombiae* ; length (♂♀) 11 mm. ; greatest width, near humeral angles, (♂) 18·5 mm, (♀) 19·0 mm. ; lateral margins straight and distinctly bordered ; front part of pronotum with a well-marked pit on each side, about equidistant between middle line and lateral margin ; hind part of pronotum with 3 longitudinal pale lines, as in *Hydrocyrius* spp., a narrow central one and two broader lateral ones, more clearly marked in the female.

Scutellum.—Without clear markings ; with transverse groove just behind anterior margin ; width at base about the same as length of side-margin (compare *Hydrocyrius colombiae*, in which width is considerably greater than length of side-margin).

Hemelytra reaching tip of abdomen, of same colour as body, but with large dark brown markings extending over almost the entire corium and clavus.

Legs conspicuously long. Front legs: Femora long (♂, 23 mm.; ♀, 24 mm.) and straight-sided (fig. 1*a*), inner margin with two longitudinal grooves as in *Hydrocyrius*, and long in comparison to width (4·2 : 1 in ♂, 4·3 : 1 in ♀, as compared with a maximum ratio of little more than 3 : 1 in species of *Hydrocyrius*); tibiae also long (♂, 15 mm.; ♀, 16 mm.) and straight-sided; claws long, equal, divergent. Middle and hind legs: femora dark brown with pale, slightly wavy transverse markings, more conspicuous in ♀ and on underside; tibiae with long swimming hairs; claws long and equal.

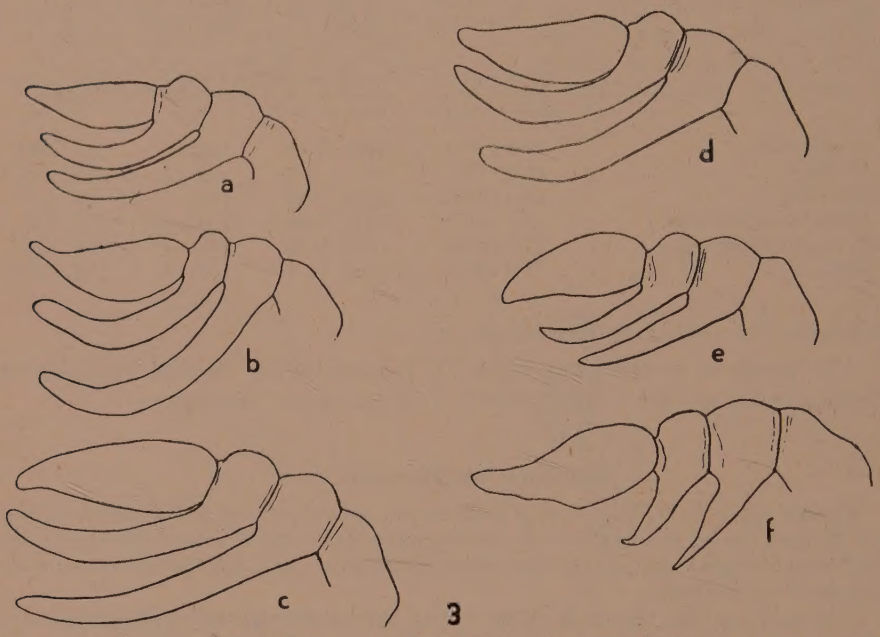

FIG. 3.—Right antenna, from below: (*a*) *Hydrocyrius rectus*, ♀; (*b*) *H. nanus*, ♂[1]; (*c*) *H. colombiae*, ♀ (the ♂ antenna is identical); (*d*) *H. rectus* form *major*, ♀; (*e*) *Poissonia longifemorata*, ♂; (*f*) *ditto*, ♀. × 16.

Male genitalia (fig. 2).—These appear to be very similar to those of *Hydrocyrius colombiae;* styles curved and tapering, divergent at apex, with a backwardly-directed pre-apical process; aedeagus flattened and spatulate, with a pore in the centre of the rounded apex; processes of 9th tergite long and covered with hairs (not shown in fig. 2).

Length: ♂, 58 mm.; ♀, 60 mm.[2]

Holotype: A single ♂, Lake Ngami district, Bechuanaland (*R. B. Woosnam*, 1912). Paratype: A single ♀, with same data. Both these specimens are in the British Museum (Natural History), London. The male has a deposition of 41 large-sized eggs on the hemelytra (*see* Plate I).

[1] Dr. Poisson states (*in litt.*) that the terminal antennal segment of *H. nanus* is normally not so strongly narrowed at the tip as in the figure given here.

[2] These measurements, as others in this paper, are taken with callipers from tip to tip, with head and body in the natural position.

Hydrocyrius rectus Mayr, form **major** f. n.

Resembling typical *H. rectus* Mayr, but larger; length 60 mm. (length of typical form 47 mm., average of 5 measured, largest 51 mm., smallest 45 mm.); maximum width across elytra, 25·5 mm. Pronotum relatively broader, maximum width (across humeral angles) to length (in middle line), 1·86 : 1 (as compared with a ratio usually, but not always, less than 1·8 : 1 in the typical form). Lateral margins of pronotum distinctly emarginate. Anterior claws long and equal, as in the type.

Holotype: A single ♀, bearing a label "Congo, 8" and "97.82" on the reverse; in the British Museum (Natural History), London.

Although this form appears distinct at first sight, being well outside the ordinary range of size of *H. rectus*, it must be borne in mind that it is in size that the main difference lies, and this is of little value as a taxonomic character in this group; Dr. Poisson, moreover, informs me that he has seen specimens of what he considers to be *rectus* varying between 44 mm. and 60 mm. in length, and that with more material one might well establish a continuous series between these extremes; at his suggestion, therefore, it is here described provisionally merely as a form of *rectus* rather than as a variety, in order to direct attention to the existence of insects quite outside the described range of size for the species, and until sufficient material becomes available to clear the matter up more satisfactorily.

A key for the separation of the known species and forms of *Hydrocyrius*, including the above, may prove useful, and is given below:

1. Anterior claws unequal . . . . . 2.
   Anterior claws equal . . . . . 4.
2. Size larger (length 54–70 mm.) . . . . . 3.
   Size smaller (length 42 mm.) . . . . . *nanus* Mont.
3. Length 65–70 mm.; greatest width across elytra 26·5–29·5 mm. Puncturation less distinct. Hemelytra less convex. Lateral hairy tracts on ventral abdominal surface narrower . . . *colombiae* Spinola.
   Length 54–61 mm.; greatest width of elytra 24–25·5 mm. Puncturation more distinct. Hemelytra more convex. Lateral hairy tracts on ventral abdominal surface broader . . . . . *punctatus* Stål.
4. Size smaller, length 47 mm. (average of 5, largest 51 mm., smallest 45 mm.); anterior tibiae almost straight; pronotum narrower, its greatest width to length in middle line usually less than 1·8 : 1. Lateral margins of pronotum straight, or only very slightly emarginate *rectus* Mayr.
   Size larger, length 60 mm.; anterior tibiae more strongly curved; pronotum broader, its greatest width to length in middle line 1·86 : 1. Lateral margins of pronotum distinctly emarginate *rectus* Mayr, form **major** f. n.

It should be mentioned that although *H. punctatus* Stål is included in this key, I am not at all satisfied, after examining a series in the British Museum standing over this name, that it is distinct from *H. colombiae*; the only points mentioned by Stål (1865) as distinguishing the species are not apparent in this series, and even in point of size there seems to be continuous variation between the series of *H. colombiae* and of *H. punctatus*. The points of distinction as given by Stål are therefore included in the key with some misgiving.

In view of these considerations it was reassuring when Dr. Poisson informed

me (*in litt.*) that, although he formerly (1929) recognized *punctatus* as a good species, he now regards it, after examination of more material, as a geographical form of *colombiae*, and that he has described it as such in a paper now in press.

ACKNOWLEDGMENTS.

I am much indebted to Dr. W. E. China for drawing my attention to the insects described above, and for allowing me the opportunity to carry out this work; and also for the generous help he gave me with the relevant literature, without which the task would have been impossible to undertake. Also, I wish to express my gratitude to Dr. R. Poisson for reading the manuscript, and offering additional information and suggestions for its improvement; and to Lieut.-Col. C. C. Champion, who has once again placed me in his debt by taking the photographs on Plate I.

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SPINOLA, M. M., 1850, *Mem. Mat. Modena* **25** (1): 43–178.

STÅL, C., 1865, *Hemiptera Africana* **3**.

PLATE I.

(*a*), (*b*), (*c*), *Poissonia longifemorata*; (*a*) male, (*b*) female, (*c*) male from below. (*d*) *Hydrocyrius colombiae*, female. (*e*) *H. nanus*, male. (*f*) *H. rectus*, female. (*g*) *H. rectus*, form *major*, female. [All figures $\frac{2}{3}$ natural size.]

BOOK NOTICES.

Papèis avulsos do Departamento de Zoologia. Vol. 7. Secretaria da Agricultura, Industria e Comercio, Sao Paulo, Brasil, 1947.

This volume of *Papèis avulsos* consists of twenty-five articles, which include a paper on the TIPULIDAE from Sao Paulo by C. P. Alexander, and four other papers on Diptera by Messias Carrera, three papers on Coleoptera by R. L. Araujo, F. Lane and E. Navajas, a paper on Lepidoptera by K. J. Hayward, on Hymenoptera by R. L. Araujo, two papers on zoological nomenclature, and several papers on spiders and harvestmen. A number of new species are described in the papers.

Field Book of Beetles. By J. R. DIBB, with a preface by B. M. HOBBY. 8vo. London: A. Brown and Sons, Ltd., 1948. Pp. xxv + 197, 14 pls. Price £1 1s.

The most notable feature of this book is that it approaches the study of British beetles from an ecological standpoint. There are five main sections entitled: beetles found on or in soil, beetles found on or attached to plants, beetles associated with animals and with man, beetles found in water, and beetles found at high altitudes.

Each of these sections is in turn divided into habitat-groups, under which the families and subfamilies are listed, with a reference to the appropriate figures. The species are then identified by the keys to the chief species of the subfamily concerned to be found in that type of locality.

The book contains several extremely useful indexes, including an index to families, subfamilies and tribes, genera and species, and plants.

E. S. Brown. Species of *Poissonia* and *Hydrocyrius*.

THE PENTATOMIDAE, CYDNIDAE AND SCUTELLERIDAE OF TRINIDAD, B.W.I.

By E. McC. Callan, B.Sc., A.R.C.S., D.I.C., Ph.D., F.R.E.S.

(*Entomology Department, Imperial College of Tropical Agriculture, Trinidad, B.W.I.*)

The Pentatomidae is one of the most distinctive families of the Hemiptera-Heteroptera, and includes some of the most conspicuous of insects, known as shield-bugs or stink-bugs, which are common wherever plants are to be found. It is a large family and comprises some 5,000 species. Although cosmopolitan in range, its greatest development is attained in the neotropical, ethiopian and oriental regions. In the tropical species especially the colours are often very remarkable, some forms exhibiting highly startling aposematic coloration. The majority of species are plant-feeding, but a few are predaceous on other insects. Among those feeding on plants are several which are destructive to cultivated crops, although, considering the size of the family, relatively few species can be regarded as major pests.

The Cydnidae can be readily distinguished from the Pentatomidae by the fossorial front legs and spinose tibiae. The family is widely distributed, being especially well represented in the tropics. The majority are rather dull-coloured insects, but a few have striking metallic hues. Little is known of their habits, but some species undoubtedly burrow in soil.

The Scutelleridae can be immediately distinguished from either of the preceding families by the enormously developed scutellum, which may conceal most of the abdomen. Distribution is more or less worldwide, with the greatest development in the tropics. Many possess rather dull colours, but others exhibit brilliant and often quite startling coloration. The majority of species feed on plants, and the habits of the family are in general very similar to the Pentatomidae.

The three families can be readily separated by the following key :

1. Scutellum very large, U-shaped, longer than the corium, covering a large part of the abdomen . . . . . Scutelleridae
   Scutellum smaller, usually triangular in shape, shorter than the corium 2.
2. Tibiae armed with several rows of stout spines. Front legs fossorial Cydnidae
   Tibiae unarmed or with only a very few small spines. Front legs not fossorial . . . . . Pentatomidae

The present list of Pentatomidae, Cydnidae and Scutelleridae includes only species from the island of Trinidad, B.W.I. This island is some 1,750 square miles in area and lies in close proximity to the mainland of South America, extending to within less than ten miles of Venezuela. It exhibits a diversity of physiographic and climatic conditions comparable with that of the adjacent part of Venezuela and the Guianas. The northern part is mountainous, attain-

ing an elevation of 3,085 ft., and there are two large swamps and several small savannas. Much of the island is covered with forest, but other areas are in cultivation, sugar cane, cacao, coconut and grapefruit being important crops. Trinidad is ecologically a part of South America, and the affinities of its fauna lie entirely with that continent and not with the Antilles.

The majority of the PENTATOMIDAE, CYDNIDAE and SCUTELLERIDAE of Trinidad are undoubtedly South American in origin. A few species, such as *Arvelius albopunctatus* (DeGeer), *Euschistus crenator* (Fabricius) and *Piezodorus guildinii* (Westwood), range from South America through the Antilles to the southern United States. *Nezara viridula* (Linnaeus) is very widely distributed. It is not only pantropical in distribution, but also occurs in many of the warmer temperate countries of the world.

The information available regarding feeding and other habits has been included in this paper. This is somewhat meagre for all but the commoner species. The majority feed on plants, but *Alcaeorrhynchus phymatophorus* (Palisot de Beauvois), *Heteroscelis brenthoides* (Walker), *Oplomus tripustulatus* (Fabricius) and *Podisus sagitta* (Fabricius) are known to be predaceous and to feed on other insects. An unusually large number of species exhibit parental care, the females brooding solicitously over the eggs and young nymphs. This instinct has been observed in *Chlorocoris depressus* (Fabricius), *Empicoris maculatus* (Laporte) and in five species of the genus *Mecistorhinus*.

Little is known regarding natural enemies of stink-bugs in Trinidad. They are, however, undoubtedly preyed upon by insectivorous birds and other vertebrates. Three species of Scelionid egg-parasites have been recorded. *Telenomus megacephala* Ashmead has been reared from the eggs of *Nezara viridula*, and *Trissolcus trinidadensis* Crawford from the eggs of *Sphyrocoris obliquus* (Germar). The eggs of several species of *Mecistorhinus* are often heavily parasitized by *Phanuropsis semiflaviventris* Girault (Callan, 1944*b*). Although I know of no definite record, *Trichopoda pennipes* (Fabricius), a widely distributed New World Tachinid parasite of stink-bugs and leaf-footed bugs, almost certainly occurs in Trinidad.

A few species are of some economic importance as pests of crops. According to Fennah (1934), the green stink-bug, *Nezara viridula*, is mainly confined in Trinidad to herbaceous members of the LEGUMINOSAE, MALVACEAE and SOLANACEAE. This pest is important, together with certain Coreid bugs, in enabling the fungi and bacteria causing various serious diseases to gain entry into the fruits of tomato, eggplant, cotton and other crops. *Arvelius albopunctatus* and *Euschistus crenator* are often common on various SOLANACEAE, especially tomato and eggplant, and doubtless play a part with *N. viridula* in the transmission of the pathogens causing fruit rots of these plants. *Piezodorus guildinii* occasionally attacks soya bean. *Mecistorhinus picea* (Palisot de Beauvois) and *M. tripterus* (Fabricius) sometimes occur in sufficient numbers to cause injury to the young shoots of cacao (Callan, 1944*a*). As far as I am aware, *Solubea poecila* (Dallas) does not occur as a pest of rice in Trinidad.

An earlier list compiled by Fennah (1935) records 24 species from Trinidad. The present enumeration is based on Fennah's list, and on additional specimens collected during the past ten years. In all 58 species are listed. These comprise 44 PENTATOMIDAE, 7 CYDNIDAE and 7 SCUTELLERIDAE. Records include

the place of collection and the name of the collector. The more important localities are shown on the accompanying map (fig. 1).

I am most grateful to the numerous persons who have contributed specimens. The full names of the collectors are as follows: A. M. Adamson, C. Bradshaw, D. J. Billes, R. W. Butler, E. McC. Callan, S. Daniel, H. S. Darling, R. G. Donald, D. Farrell, R. G. Fennah, T. H. Khan, I. E. Kirby, G. H. Lord, J. H. Mahon, E. R. H. Martin, Ruth J. O'Connor, S. Ramsumire, P. D. Smith, F. W. Urich, D. Vesey-FitzGerald, C. L. Withycombe, G. N. Wolcott and Patricia C. Wright (*née* Atteck).

FIG. 1.—The more important localities in Trinidad, B.W.I., where PENTATOMIDAE, CYDNIDAE AND SCUTELLERIDAE have been collected.

I am greatly indebted to various specialists for the determination of material, notably to Dr. B. P. Uvarov at the British Museum (Natural History), Dr. H. G. Barber and Dr. R. I. Sailer of the United States National Museum and Professor C. J. Drake of Iowa State College. Dr. C. F. W. Muesebeck of the U.S. National Museum kindly determined the Scelionid egg-parasites. Almost all the specimens are in the collection of the Imperial College of Tropical Agriculture, Trinidad, B.W.I., but a few are deposited in the U.S. National Museum, Washington, D.C.

Family PENTATOMIDAE.

Acrosternum nitida Westwood

Recorded by Fennah (1935) on red-flowered *Ixora coccinea* and yellow-flowered *I. lutea*. St. Augustine (*O'Connor*).

Agroecus griseus Dallas

Recorded by Fennah (1935). At light, St. Augustine (*Vesey-FitzGerald*).

Alcaeorrhynchus phymatophorus (Palisot de Beauvois)

Fennah (1935) records this species as *A. grandis* Dallas. It is probably predaceous on other insects. On pigeon pea, St. Augustine (*Fennah*); St. Augustine (*Callan*).

Architas pudens Distant

St. Augustine (*Butler*).

Arocera protea var. *affinis* Distant

On soya bean, St. Augustine (*Mahon*).

Arvelius albopunctatus (DeGeer)

This is a widely distributed species, ranging from Brazil to the southern United States. In Trinidad it is very common on eggplant, and is occasionally found on tomato and other SOLANACEAE. The fruits of the plant are attacked and it is sometimes sufficiently abundant, especially in the dry season from January to April, to rank as a minor pest of eggplant. There can be little doubt that it is of importance, together with the green stink-bug, *Nezara viridula*, and certain Coreid bugs, in enabling various pathogens causing fruit rots of eggplant and tomato to gain entry into the fruits.

San Juan (*Fennah*); Maracas Valley (*Callan*); St. Augustine (*Khan* and *Callan*).

Banasa varians Stål

On eggplant, San Juan (*Callan*); St. Augustine (*Adamson*, *Bradshaw* and *Callan*).

Berecynthus delirator Fabricius

Recorded by Fennah (1935) on low herbage in open forest, Moruga (*Fennah*); St. Augustine (*Callan*).

Capivaccius bufo Distant

On bamboo, St. Joseph (*Urich*); Moruga (*Urich*).

Chlorocoris depressus (Fabricius)

This species has been found feeding on cacao (Callan, 1944*a*). The females exhibit parental care by brooding over the eggs. Diego Martin (*Darling*); Gran Couva (*Callan*); Santa Cruz (*Callan*).

Cyrtocoris gibbus (Fabricius)

St. Augustine (*Fennah*).

Discocephala deplanata Walker

St. Augustine (*Fennah*).

Edessa affinis Dallas

Fennah (1935) records *Hibiscus* and chandelier, *Leonotis nepetaefolia*, as common host plants of this species, and states that it does not appear to be specialized as regards feeding habits. It is a common species in Trinidad and has been recorded on many plants.

On tobacco, St. Augustine (*Smith*); on pigeon pea, St. Augustine (*Callan*); on black sage, St. Augustine (*Donald*); on cacao, Brasso (*Callan* and *Daniel*);

St. Augustine (*O'Connor*); Port of Spain (*Wright*); Spring Hill (*Fennah*); Arouca (*Khan*); Tacarigua (*Khan*); Tunapuna (*Khan*); Diego Martin (*Callan*); Cumaca (*Kirby*).

Edessa jugata Westwood

On black sage, St. Augustine (*Kirby*); St. Augustine (*Callan*).

Edessa meditabunda Fabricius

Fennah (1935) records this species as frequently found in all stages of development on *Hibiscus* and soya bean, and notes that like *E. affinis* it is not a restricted feeder. According to Fennah the eggs are pale green, each 1 mm. in height and approximately spherical in shape, and the female lays about 14 at a time, often in two contiguous rows of seven eggs each.

On tobacco, St. Augustine (*Smith*); on black sage, St. Joseph (*Donald*); on eggplant, San Juan (*Callan*); on pigeon pea, Palo Seco (*Callan*); St. Augustine (*Adamson, Fennah, Martin* and *Callan*); Tacarigua (*Khan*); summit of Mount El Tucuche, 3072 ft. (*Callan*); Maracas Bay (*Wright*); San Fernando (*Urich*).

Edessa nigrispina Dallas

Cumaca (*Adamson*).

Edessa vitulus Fabricius

Forest Reserve (*Mahon*).

Edessa spp.

Several species of this important genus have not yet been determined. O'Meara Savanna (*Callan*); Brasso (*Daniel*); Maracas Valley (*Callan*); St. Augustine (*Kirby*).

The most striking is one found by Mr. I. E. Kirby feeding on cat's claw creeper, *Bignonia unguis-cati*, at St. Augustine. This is a large species, about 16 mm. in length, the pronotum with prominent blunt humeral angles tipped with black. Dr. R. I. Sailer, to whom specimens were submitted, states (*in litt.*, 1946): "I am still unable to place a specific name on this species. The genus *Edessa* is very large, and the task of deciding whether a species has been described by studying the literature is very difficult, if not impossible, in view of the inadequacies of many of the descriptions. So far as I can tell this form is nearest *Edessa genitilitia* Distant."

Empicoris lineatus (Dallas)

Summit of Mount El Tucuche, 3072 ft. (*Callan*).

Empicoris maculatus (Laporte)

The females exhibit parental care by brooding over the eggs. Maracas Valley (*Adamson* and *Callan*).

Euschistus atrox Westwood

Fennah (1935) records this species on soya bean. St. Augustine (*Fennah*); on Sea Island cotton, St. Augustine (*Callan*); on black sage, Caroni (*Donald*); Diego Martin (*Urich*); San Juan (*Urich*); Arouca (*Khan*); O'Meara Savanna (*Callan*); summit of Mount El Tucuche, 3072 ft. (*Callan*).

Euschistus crenator (Fabricius)

This is a widely distributed species ranging from South America to the southern United States. In Trinidad it is sometimes very common feeding on the fruits of tomato, often in company with Coreid bugs, with which it probably plays a part in the transmission of the various fungi and bacteria causing fruit rots.

On *Heliotropium indicum*, Chaguanas (*Donald*); on black sage, Diego Martin (*Callan*); on gamalote grass, Santa Cruz (*Callan*); on tomato, St. Augustine (*Callan*); Maracas Valley (*Callan*).

Heteroscelis brenthoides (Walker)

This species is predaceous in habit. It has been found feeding on the larvae and adults of the leaf-eating beetle, *Schematiza cordiae* Barber, on black sage. St. Augustine (*Donald* and *Kirby*).

Loxa affinis Dallas

Recorded by Fennah (1935). At light, Mount St. Benedict (*Fennah*); at light, St. Augustine (*Callan*).

Loxa sp.

St. Augustine (*Fennah*).

Macropygium reticulare Fabricius

Recorded by Fennah (1935). St. Augustine (*Billes* and *Callan*); Poole (*Urich*); Montserrat Hills (*Adamson*); Brasso (*Callan*); on undergrowth under cacao, Gran Couva (*Callan*).

Mecistorhinus macraspis (Perty)

This species has been found feeding on cacao (Callan, 1944*a*). The females exhibit parental care by brooding over the eggs and young nymphs. Tabaquite (*Callan*); Maracas Valley (*Callan*).

Mecistorhinus mixtus (Fabricius)

This species feeds on cacao (Callan, 1944*a*). The females exhibit parental care, and the eggs are often parasitized by *Phanuropsis semiflaviventris* (Callan, 1944*b*).

Fennah (1935) records this species feeding on West Indian almond. Mount St. Benedict (*Adamson* and *Fennah*); on saman, St. Augustine (*Callan*); on *Eucalyptus deglupta*, St. Augustine (*Billes*); at light, St. Augustine (*Callan*).

Mecistorhinus picea (Palisot de Beauvois)

This stink-bug is the species occurring most commonly on cacao in Trinidad and has been found in many cacao-growing districts (Callan, 1944*a*). It is sometimes present in sufficient numbers to cause injury in the cacao nurseries at St. Augustine. The females exhibit parental care, and the eggs are often highly parasitised by *Phanuropsis semiflaviventris* (Callan, 1944*b*).

Fennah (1935) records this species on cacao. St. Augustine (*Fennah*); on

cacao, Sangre Grande (*Callan*); on cacao, St. Augustine (*Callan*); Port of Spain (*Wright*); St. Augustine (*Wright*).

Mecistorhinus tripterus (Fabricius)

In Trinidad this stink-bug is only a little less common on cacao than the preceding species and has been found in many localities (Callan, 1944*a*). On occasion it is sufficiently abundant to cause some damage in the cacao nurseries at St. Augustine. The females exhibit parental care, and the eggs are often attacked by the egg-paratise, *Phanuropsis semiflaviventris* (Callan, 1944*b*).

Fennah (1935) records this species on cacao. St. Augustine (*Fennah*); on cacao, St. Augustine (*Callan*); on cacao, Diego Martin (*Callan*); on cacao, San Rafael (*Callan*); on avocado, St. Augustine (*Callan*); on *Gliricidia sepium*, St. Augustine (*Callan*); at light, St. Augustine (*Callan*); St. Augustine (*Wright*); Port of Spain (*Wright*).

Mecistorhinus variolosus (Westwood)

This species has been found feeding on cacao (Callan, 1944*a*). The females exhibit parental care. St. Augustine (*Adamson*, *Fennah*, *Daniel* and *Callan*).

Mormidea ypsilon (Linnaeus)

This is one of the commonest stink-bugs in Trinidad. Fennah (1935) records it as common on GRAMINEAE, stating that it is often abundant on gamalote grass, a troublesome weed in cacao plantations. He also records it on black sage. Balandra (*Fennah*); Moruga (*Fennah*); Spring Hill (*Fennah*); Toco (*Fennah*); Chaguanas (*Adamson*); Sangre Grande (*Callan*); St. Augustine (*Adamson*, *Fennah* and *Callan*); on gamalote grass, Brasso (*Callan*); on gamalote grass, Diego Martin (*Callan*).

Nezara viridula (Linnaeus)

This species is commonly known as the green stink-bug and is very widely distributed, occurring in most of the warmer parts of the world. In Florida, U.S.A., but apparently not elsewhere, it is a serious pest of citrus, and in other countries it is known to attack cotton, tobacco, vegetables and other crops. Its importance is due not only to the direct injury caused by feeding but also because of its ability to transmit various destructive fungi and bacteria which attack plants. It is often associated with various Coreid bugs, such as *Leptoglossus balteatus* (Linnaeus) and *Phthia picta* (Drury), which are undoubtedly important also as regards disease transmission. According to Fennah (1934, 1935), the green stink-bug is mainly confined in Trinidad to cultivated herbaceous crops, such as tomato, eggplant, tobacco, cotton, okra, groundnut, pigeon pea and soya bean among others. It may sometimes attain the status of a minor pest on tomato and eggplant, and on these plants it is often found in company with other stink-bugs, such as *Arvelius albopunctatus* and *Euschistus crenator*. The eggs are parasitized by *Telenomus megacephala*.

On soya bean and tomato, St. Augustine (*Fennah*); on tomato, eggplant, cowpea and Sea Island cotton, St. Augustine (*Callan*); Maracas Valley (*Callan*); Tacarigua (*Khan*); Port of Spain (*Farrell*).

Ochlerus marginatus (Fabricius)

Brasso (*Callan*).

Oplomus tripustulatus (Fabricius)

This species and its variety *violaceus* Dallas have been found on black sage. They are almost certainly predaceous, and have been found associated with larvae and adults of the leaf-eating beetles, *Physonota alutacea* Boheman and *Schematiza cordiae* Barber, on which they probably feed. St. Augustine (*Kirby*); Caroni (*Donald*).

Pharypia pulchella (Drury)

St. Augustine (*Callan*); on *Gardenia jasminoides*, St. Augustine (*Daniel*).

Piezodorus guildinii (Westwood)

This species ranges from South America to the southern United States. Fennah (1935) records it and notes that leguminous crops such as soya bean appear to be preferred hosts. On soya bean, St. Augustine (*Fennah* and *Callan*).

Platycarenus humilis (Herrich-Schaeffer)

This species has been found feeding on cacao (Callan, 1944*a*). Diego Martin (*Callan*); Sangre Grande (*Callan*).

Podisus sagitta (Fabricius)

This is a predaceous species. It has been found feeding on the larvae of the tropical cabbage butterfly, *Ascia monuste* (Linnaeus), on cabbage. San Juan (*Callan*).

Proxys albopunctatus (Palisot de Beauvois)

Recorded by Fennah (1935) on Guatemala grass, elephant grass and rice. On Guinea grass, Santa Cruz (*Callan*); St. Augustine (*Fennah* and *Callan*); San Rafael (*Adamson*); Maracas Bay (*Wright*); Maracas (*Callan*); Brasso (*Callan*); Icacos (*Callan*).

Solubea poecila (Dallas)

There is some doubt as to whether this important South American pest of rice should be included in the Trinidad list. Sailer (1944) records it from " San Fernando, Trinidad (rice field)." Dr. R. I. Sailer (*in litt.*, 1946) kindly informs me that this record is based on a single specimen in the United States National Museum, collected by Dr. Harold Morrison, 18th October, 1918, whose notes read, " swept from a rice field between San Fernando and La Brea, Trinidad, about 7 miles from San Fernando." Dr. Sailer further mentions that the specimen is not typical of the species as it occurs in British Guiana.

I know of no other specimen from Trinidad, and the above record is included for the sake of completeness. *Solubea poecila* certainly does not occur as a pest of rice in Trindad, although its absence is rather surprising in view of its occurrence in South America.

Thyanta antiguensis (Westwood)

On flowers of *Celosia cristata*, Chaguanas (*Callan*).

Thyanta casta Stål

At light, St. Augustine (*Callan*); on black sage, San Juan (*Callan*); on inflorescences of black sage, Bejucal (*Callan*).

Thyanta perditor (Fabricius)

This is a widely distributed species, ranging from northern South America to the southern United States. Fennah (1935) records it as feeding on soya bean and *Sesbania aegyptiaca*. St. Augustine (*Fennah*); on sunn hemp, St. Augustine (*Callan*).

Tibraca limbativentris Stål

St. Augustine (*Fennah*); on rice, Caroni (*Ramsumire*).

Vulsirea violacea (Fabricius)

Arima (*Khan*).

Family Scutelleridae.

Augocoris illustris (Fabricius)

At light, Mount Harris (*Vesey-FitzGerald*).

Camirus conicus (Germar)

St. Augustine (*Lord*).

Cyrtocoris gibbus (Fabricius)

St. Augustine (*Fennah*).

Pachycoris torridus Scopoli

On physic nut, *Jatropha curcas*, St. Augustine (*Wright*).

Sphyrocoris obliquus (Germar)

Recorded by Fennah (1935) on soya bean, St. Augustine (*Fennah*). On Sea Island cotton, St. Augustine (*Callan*); on black sage, St. Augustine (*Donald*); Maracas Bay (*Wright*); Rio Claro (*Wright*); Brasso (*Callan*). The eggs are parasitized by *Trissolcus trinidadensis*.

Symphylus deplanatus (Herrich-Schaeffer)

Recorded by Fennah (1935) on black sage. St. Augustine (*Fennah*).

Symphylus rivulosus Walker

On *Hibiscus rosa-sinensis*, St. Augustine (*O'Connor*). St. Augustine (*Callan*).

Symphylus sp.

On black sage (*Kirby*).

Family Cydnidae.

Aethus sp.

Dr. R. I. Sailer (*in litt.*, 1945) informs me that this species is probably undescribed. Cumaca (*Kirby*).

Amnestus pusillus Uhler

In considerable numbers at light, St. Augustine (*Callan*).

Amyssonotum rastratum Stål

Spring Hill (*Fennah*).

Cyrtomenus grossus Dallas

St. Augustine (*Lord*).

Cyrtomenus mirabilis Perty

St. Augustine (*Callan*).

Galgupha schulzii (Fabricius)

On flowers of *Borreria verticillata*, Mausica Savanna (*Callan*); on flowers of *B. verticillata*, St. Augustine (*Wolcott*); Maracas (*Callan*); Diego Martin (*Callan*).

Galgupha vinculata Germar

On flowers of *Borreria verticillata*, Toco (*Callan*); on flowers of *B. verticillata*, St. Augustine (*Wolcott*); St. Augustine (*Callan* and *Kirby*).

Pangaeus margo Dallas

St. Augustine (*Withycombe* and *Fennah*).

Common and Scientific Names of the More Important Host Plants.

Avocado	*Persea americana* Mill.
Bamboo	*Bambusa vulgaris* Schrad.
Black sage	*Cordia macrostachya* (Jacq.) Roem. & Schult.
Cacao	*Theobroma cacao* L.
Cowpea	*Vigna unguiculata* Walp.
Eggplant	*Solanum melogena* L.
Elephant grass	*Pennisetum purpureum* Schum.
Gamalote grass	*Setaria poiretiana* (Schult.) Kunth.
Groundnut	*Arachis hypogaea* L.
Guatemala grass	*Tripsacum laxum* Nash
Guinea grass	*Panicum maximum* Jacq.
Indian almond	*Terminalia catappa* L.
Okra	*Hibiscus esculentus* L.
Pigeon pea	*Cajanus indicus* Spreng.
Rice	*Oryza sativa* L.
Saman	*Pithecellobium saman* Benth.
Sea Island cotton	*Gossypium barbadense* L.
Soya bean	*Glycine max* (L.) Merr.
Sunn hemp	*Crotalaria juncea* L.
Tobacco	*Nicotiana tabacum* L.
Tomato	*Lycopersicum esculentum* Mill.

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ON THE CLASSIFICATION OF THE GENERA ALLIED TO *MUSCA* L. (DIPTERA).

By J. E. Collin, F.R.E.S.

Many attempts have been made to separate from the Calyptrate Muscidae the genera allied to *Musca* L., and to distinguish them as a distinct family, or at least as a subfamily of one section of that complicated mass of closely related genera. No attempt has held the field for long, but with the great increase in our knowledge during recent years of the insects concerned, a closer approximation to a natural grouping ought to be possible, and is now tentatively suggested.

The following is a brief history of previous attempts beginning with the publication of Schiner's *Fauna Austriaca* in 1862, when the "Muscinae" included those genera with a bent or upcurved end to discal vein, an arista plumose to tip, abdomen short ovate without strong macrochetae, and legs comparatively short. The subfamily based on these characters was raised to family rank by Townsend in 1890 (*Proc. ent. Soc. Wash.* **2**). Meanwhile an important step forward was made when Osten-Sacken in 1881 (*Mitt. Munch. ent. Ver.* **5**) noted that the absence of distinct hypopleural bristles was a character in which the Anthomyiidae differed from the rest of the Calyptrate Muscids; and this led to the acceptance by Girschner in 1893 (*Berl. ent. Z.* **38**) of the presence of such bristles as a distinguishing character of the Tachinidae (or super-family Tachinoidea), and the transfer to the Tachinidae from Schiner's Muscinae of the genera *Idia*, *Pollenia*, *Protocalliphora*, *Calliphora* and *Lucilia*. In 1896 (*Illustr. Wochenschr. Ent.* **1**) Girschner considerably enlarged the boundaries of Schiner's Muscinae by using characters in the abdominal sternites (especially of males), and thoracic chaetotaxy, incidentally including in the subfamily all allied genera (except those of the Coenosinae) in which the anal vein does not reach the wing-margin, but his conclusions have not been generally accepted.

In 1907 (Kertesz's *Katalog* **3**) a modification of Girschner's arrangement was adopted by Bezzi and Stein. Of those genera without hypopleural bristles left in Schiner's Muscinae, *Graphomyia*, *Morellia*, *Musca* (*sens. lat.*), *Dasyphora*, *Pyrellia*, *Orthellia* and *Mesembrina* were grouped together as "Muscinae muscaeformes," and the genera *Stomoxys*, *Haematobia*, *Lyperosia*, and *Muscina*, with most of the Anthomyiidae more recently known as the Phaoniinae (including *Polietes*), the Fanniinae, and the Mydaeinae, as a separate section of "Muscinae ariciaeformes." It will be noted that the "muscaeformes" include all genera with broad squamae extending close to, or under, the side margin of the scutellum.

Schnabl and Dziedzicki in 1911 (*Die Anthomyiden*) published an arrangement of the genera based mainly on differences in the male genitalia, in which *Mesembrina*, *Dasyphora*, *Pyrellia* and *Orthellia*, as "Muscinae Ord. II, vel dasyphoraeformes," were widely separated by the interpolation of the "Muscinae ariciiformes" from a group which they called the "Muscinae Ord. I, vel limnophoraeformes," and which included the genera *Graphomyia*, *Muscina*,

Morellia, *Haematobia*, *Lyperosia*, *Stomoxys*, *Glossina*, *Musca* (*sens. lat.*) and *Atherigona*. It appears certain that the genital characters used by these authors were not always correctly selected for their phylogenetic importance.

In 1908 (*Smithson. misc. Coll.* **51**) Townsend called attention to the value of pteropleural vestiture as a character in the Muscoidea, but suffered like all previous students from the obsession that the upcurved discal vein was of primary importance. Malloch in 1925 (*Ann. Mag. nat. Hist.* (9) **16**), on the other hand, supported the idea that *Musca* and its allies, in spite of the upturned discal vein, belonged to the family Anthomyiidae, even " doubted the propriety of retaining Muscinae as distinct from Phaoniinae," but thought it possible to distinguish such a subfamily by the possession of thoracal squamae more or less transverse on its posterior curvature, its inner basal angle close to and frequently touching or underlying the basal lateral angle of the scutellum, and this character was accepted by van Emden in 1939 (*Ruwenzori Exped.* **2** (3)) as the sole distinguishing feature of the Muscinae, without calling attention to the fact that Malloch in 1929 (*Insects of Samoa* **6**) had suggested a qualification of his previous characterization by adding " if the lower squama is narrow the pteropleura is setulose, and the fourth wing vein is distinctly bent forward at the tip, with the bend beginning at or before the middle of its terminal section, or else the middle tibia has a strong bristle almost on its ventral surface near the middle."

In 1929 (*Ent. Tidskr.* **50**) Ringdahl, who considers (as I believe correctly) the Cordyluridae to represent a distinct family, proposed including in the Muscinae all Anthomyid genera (including those of the Coenosinae) in which the anal vein does not extend to the wing margin. This character may well be accepted as one both convenient and sound for distinguishing a *family* Muscidae from a *family* Anthomyiidae in which the anal vein extends (at least faintly) to the wing margin, but there still remains the question of defining a subfamily Muscinae.

Returning once again to the genera left in Schiner's Muscinae after the transfer of those with hypopleural bristles to the Tachinidae, and of *Myiospila* to the neighbourhood of *Mydaea*, and accepting the fact that the presence of pteropleural vestiture has considerable phylogenetic significance, it becomes advisable to examine the possibility that this subfamily Muscinae might be found to become a more homogeneous group of genera by eliminating *Graphomyia* and *Muscina* in which the pteropleurae are bare, and including *Polietes* (*sens. lat.*) with setulose pteropleurae. This would of course mean according a higher phylogenetic value to the character of a setulose pteropleura than to a broad thoracic squama, which is certainly correct for the Tachinidae. Such a revised subfamily Muscinae might be characterized, so far at least as the Palaearctic fauna is concerned, as follows :

Pteropleurae with bristles or bristly hairs ; sternopleural bristles, if more than 1 : 1, arranged in a shallow curve ; male with distinct strong vertical bristles ; when the male vertical bristles are not very distinct, and the pteropleurae bear only a few hairs, then proboscis adapted for blood-sucking, strongly chitinized, and with very small labellae.

Remarkable confirmation that this is an arrangement of naturally allied genera, and that those excluded are more nearly related to such genera as *Phaonia*, *Mydaea*, *Hebecnema* and *Hylemyia*, is to be found in certain characters

in their early stages, details and figures of which appeared in an article by R. C. Muirhead Thompson published in 1937 (*Parasitology* **29** : 273–358). The two most important of these characters are to be found in the structure of the egg and of the posterior larval spiracles. In the MUSCINAE, as restricted above, the egg is what Thompson designates as "the *Musca* type"; it is cylindrical, oval, with the dorsal surface slightly concave and the ventral surface convex ; the parallel dorsal ribs, usually faint, are separated by a narrow strip *and never project as flanges*. *Polietes* agrees in egg structure with this "*Musca* type " and not with that of neighbouring Anthomyid genera, while *Graphomyia* and *Muscina* have eggs of " the *Phaonia* type," i.e. with broad flanges widely separated and running strictly parallel to each other throughout their length, the flanges not produced into processes anteriorly but equally developed at each end, the surface between the flanges flat, while the other convex surface is usually marked with longitudinal corrugations.

In *Myiospila* the eggs are of a somewhat different type inasmuch that the lateral flanges gradually diverge towards the anterior end, where they become more divergent and project as pointed processes. They resemble those of *Hebecnema* and *Mydaea*, so that the systematic position assigned to *Myiospila* by Girschner is so far confirmed.

The differences in the posterior spiracles of the larvae lie in the shape (in plan) of the slits. They are serpentine, S-shaped, or at least with a fold back at one end, in the MUSCINAE, and are arranged more or less in a semicircle, end to end. In other Muscids they are straight, or at least without any serpentine bends, and are arranged one above another, or each one slightly diverging at the outer end from the next. *Graphomyia* is intermediate in one respect : a short length of each slit is bent back, but the slits are arranged one above the other as in *Phaonia*, etc. *Polietes* has the sinuous slits of the MUSCINAE, and *Muscina* the straighter radiating slits of *Mydaea*.

Graphomyia becomes an interesting, isolated genus with characters showing some affinity with the subfamily PHASIINAE of the TACHINIDAE as well as with the MUSCIDAE ; this, coupled with its wide geographical range and semi-aquatic larvae, indicate an ancient genus, probably representative of a distinct subfamily of the MUSCIDAE.

The African genus *Graphomuscina* T. T., included by Townsend with *Graphomyia* in a tribe Graphomyiini, is described as having pteropleura haired, indicating still closer relationship with the MUSCINAE, though, of course, this character is not one confined to the MUSCINAE alone among the MUSCIDAE, as proved in the case of *Lispe*. An examination of eggs dissected from a gravid female of a species of *Lispe* shows that they are definitely more like those of *Mydaea* than those of *Musca*, but the projecting ends of flanges are fringed. It is possible that such examination may prove of considerable use in determining the relationship (otherwise doubtful) of certain Muscid genera, including *Graphomuscina*.

It is submitted that there is evidence, based upon a study of Palaearctic material, that a subfamily MUSCINAE of the MUSCIDAE can be defined by characters present in both the early and adult stages. This evidence is necessarily fragmentary, and the conclusions derived therefrom are therefore based upon premises the truth of which must remain a matter for further research and confirmation.

ETHIOPIAN CULICIDAE: SOME NEW MOSQUITOES FROM UGANDA.

By Mrs. E. C. C. van Someren

(*Division of Insect-Borne Diseases, Medical Research Laboratory, Nairobi, Kenya*).

Megarhinus ruwenzori sp. n.

This mosquito belongs to the *Megarhinus lutescens* group (Edwards, 1941), and differs from all other known species of this group by having a large patch of dark shining blue scales in the middle of the pleurae and by having white scales on the *ppn*.

Female.—Head covered with flat dark brown scales which have a green metallic sheen. Tori black with a grey bloom and a few short hairs on the internal border; first flagellar segment of the antennae with a few short black scales above. Palpi golden below, coppery above, with shining blue patches at tip and middle. Proboscis yellow below, brown above, with the scales showing brassy, purple, and blue sheens on the basal half. *Thorax:* Scutum covered with dark brown scales which have a green sheen except on the posterior borders, where there are narrow stripes of golden scales; *apn* covered with metallic blue scales, *ppn* with flat white scales below and a narrow line of dark golden ones above; sternopleurae with 2 fine golden hairs about the middle, and covered with white scales above to alar knob; below there is a large patch of dark scales which have a blue sheen which is only seen in certain lights and is more obvious under low powers. (These scales appear to be pale and transparent with a blue iridescence. When the light is such that the blue iridescence is not seen, these scales appear to be dark brown owing to the dark pleural integument behind.) Mesepimeron covered with white scales above, dark shining blue scales as on lower sternopleurae below, and with a patch of white scales on the lower posterior corner; scales on all coxae golden. The white scales on the pleurae all tend to have a yellow sheen. *Abdomen:* First tergite blue-green medianly, golden laterally; tergites 2–8 dark coppery-purple with a blue sheen above and narrowly golden laterally; sternites golden yellow with faint indications of a narrow dark median line on all segments; caudal tufts golden, very small, and with few hairs. *Legs:* Dark areas with a blue or purple sheen and a few scattered brassy scales. All femora are extensively golden yellow below and posteriorly, and the dark dorsal line is narrow basally and widens out towards the tip, especially on the anterior surface, and the tip is narrowly dark all round; mid femora with a small whitish spot at tip above. Fore and mid tibiae dark above and pale bluish-white below to near tip, the pale line below most noticeable and whiter on the mid tibiae; hind tibiae dark above, pale below and with a small white patch below at about two-thirds. Fore tarsi with the first segment dark above and pale whitish below; second segment dark anteriorly and pale whitish below and posteriorly for full length; third dark anteriorly and whitish posteriorly on the basal half; 4–5 all dark. Mid tarsi with the first segment dark above but slightly paler on the basal half, pale below for the full length, and white posteriorly on the basal half; second segment all white; third with a white patch posteriorly on basal half; 4–5 all dark. First segment of hind tarsi with a white patch below slightly removed from the base; second all dark; third white all round on the basal two-thirds; 4–5 all dark.

Male.—This male differs from the known species with golden caudal tufts, *M. lutescens* Theobald and *M. nairobiensis* van Someren, on the character of the ninth tergite and by

having white markings on the mid tarsi. Unfortunately the thorax of this specimen is very rubbed and the lower mesepimeron and sternopleurae are almost completely denuded, but a few transparent shining blue scales are present on these areas. The *ppn* is covered with white scales and this, with the evidence of shining blue scales on the lower sternopleurae, the breeding place, and the locality all tend to show that this specimen is the same species as the female described above.

The male differs from the female as follows :

Head.—Palpi golden below to near tip of penultimate segment, dark above, and with about 6 short, stout hairs on penultimate segment below. *Thorax :* The patch of white scales on the upper sternopleurae and mesepimeron appears to extend further down. Abdominal tergites more blue than in the female. *Legs :* Anterior surfaces of femora darker. Fore and middle tibiae very narrowly pale blue below ; hind tibiae broadly pale blue below apically but no definite white spot seen. Fore tarsi all dark ; mid tarsi with the second segment narrowly white below on apical two-thirds ; first segment of hind tarsi with a white patch below just beyond the base, second segment all dark, third white all round on a little more than the basal half, 4–5 all dark. *Terminalia :* Style not greatly enlarged in the middle ; tergite not greatly emarginate, and with a group of 21 long hairs on each lobe.

Pupa and *Larva* indistinguishable from those of *M. nairobiensis* van Someren (1946).

Described from allotype, Kizimba 7-8000 ft. (*A. J. Haddow*), holotype, Bwamba Pass 8–8500 ft. (*van Someren*), North Spur, Ruwenzori, Uganda, and bred from larvae collected from bored bamboos.

Field Notes.—About a dozen larvae were collected from bored bamboos on the Bwamba Pass, but owing to their extremely slow growth and the fact that they had to be transported 600 miles soon after collection, only one was brought alive to Nairobi and eventually bred out. It is interesting to note that the larvae appear to be only in bamboos which contain larvae of *Uranotaenia* species (probably mainly *U. shillitonis* Edwards), none being found in bamboos which contained *Culex* larvae. Many of the bamboo *Culex* larvae were given to the *Megarhinus* as food ; these were hunted and killed, but none seemed to be eaten. In the space of about 15 minutes one *Megarhinus* larva attacked and killed 3 *Culex*, but after holding them for a moment dropped them and took no further interest in the prey. The one larva that was eventually bred to adult was fed on larvae of *Aedes aegypti* Linnaeus, and many of these were killed but not eaten. This may be due to a habit noted below of the late fourth stage larvae.

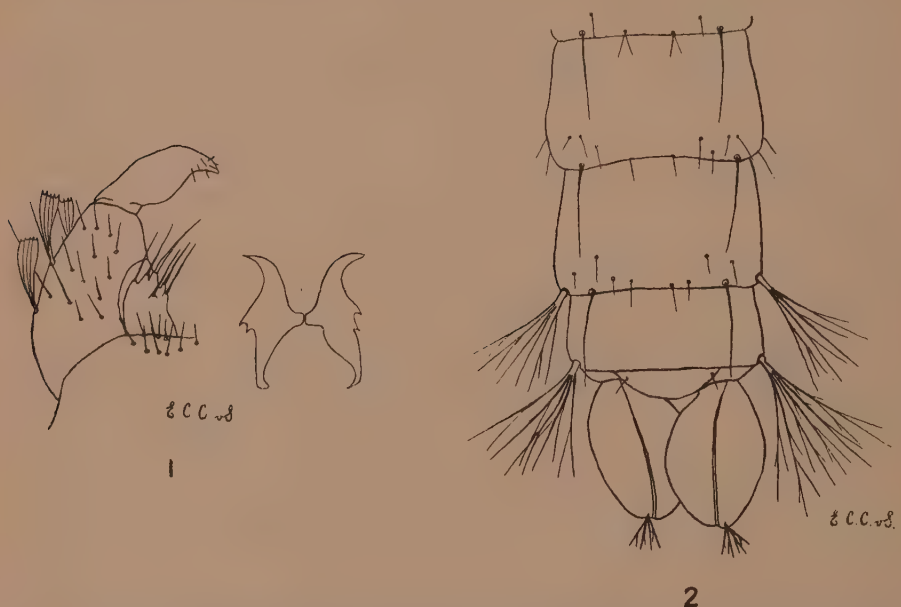
The Bwamba Pass larvae were pale creamy-white below and pinkish purple above and rather transparent. Dr. Haddow tells me that the Kizimba larva was white when collected, and developed a faint brick red marbling on the thorax as it grew. Both larvae were fourth stage when collected, and remained in the larval stage for 16 (Kizimba) and 20 (Bwamba Pass) days before pupating. The pupal stage lasted 9 (Kizimba) and 11 (Bwamba Pass) days. The larvae did not become sluggish before pupating but remained active, the Kizimba larva killing 10–20 larvae of *Aedes simpsoni* Theobald per hour though not eating them (Haddow, private communication). The tail of the pupae was not curved under the head like the species of the *brevipalpis* group but hung straight down, and although it sometimes swam like an ordinary pupa with vigorous movements of the tail, it more often swam forward with a weak wriggle.

Uranotaenia garnhami sp. n.

This species is very like *U. shillitonis* Edwards, but the broad white scales on the *apn*, the absence of scales on the mesepimeron and the broad white border round the front margin of the scutum will readily separate this species from *shillitonis*.

Female unknown.

Male.—Head: Decumbent scales broad flat and dark behind with a band of white scales round eye margins. Tori and first flagellar segment of antennae with a few small white scales above. Proboscis and palpi dark. *Thorax:* Scutum covered with broad



Figs. 1–2.—1. *Uranotaenia garnhami* sp. n. Male terminalia. 2. *Uranotaenia garnhami* sp. n. Terminal segments of pupal abdomen.

scales, grey-brown above, and round front margin there is a broad band of white scales which is continued along the lateral margins to above wing-roots; dorso-central bristles long but not very stout; acrostichal bristles absent; *apn* and *ppn* covered with broad white scales; a patch of broad white scales on middle of sternopleurae, but no scales on the mesepimeron. *Legs:* dark brown; all femora pale below, extensively towards the base. *Abdomen:* Tergites covered with dark brown scales; sternites all pale scaled. Terminalia (fig. 1) very like those of *shillitonis* as described and figured by Edwards (1941); differ as follows: Style sharp pointed and very broad basally, short, about $\frac{1}{2}(\frac{5}{8})$ the length of the coxite (in *shillitonis* the style is about $\frac{3}{4}(\frac{4}{5})$ the length of the coxite); basal lobe not darkened; phallosome with the two lateral teeth very small.

Pupa (fig. 2).—Very like *U. shillitonis* as described and figured by Edwards (1941), but readily distinguished as follows: H and K single, H much longer than K. B on segments III-VII long, about the length of the segment, single, simple, and black. A VI not noticeable. Paddles appear to be rather larger; seta about one-third the length of the paddles, and with 4–5 branches which may be divided again apically.

Larva (fig. 3).—Resembles *U. shillitonis* (Hopkins, 1935) by having the ventral brush arising from a large sclerotised boss and by having no comb plate, but is easily distinguished by the shape of the siphon and the greater number and shape of the pecten teeth, and by having the comb composed of scales.

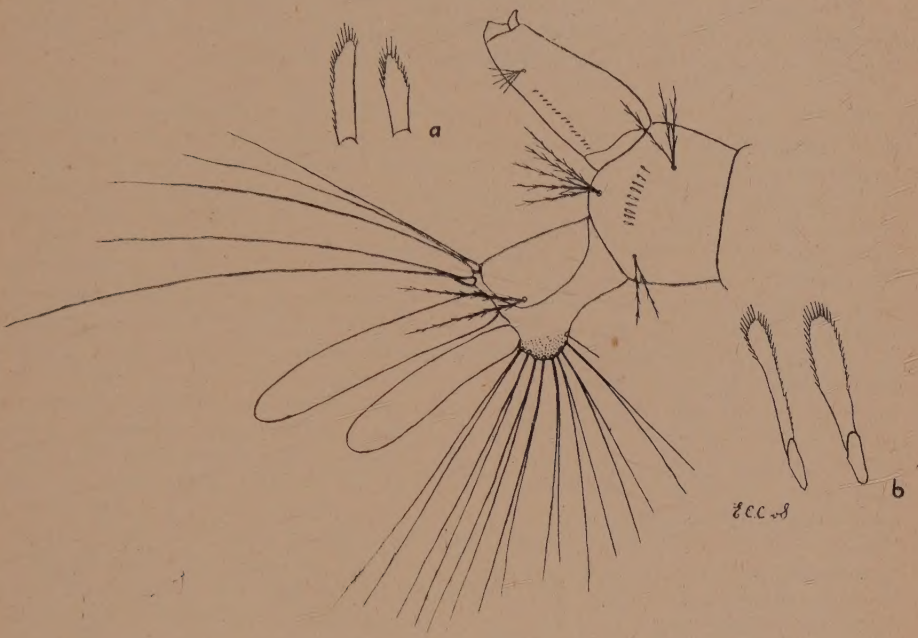


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FIG. 3.—*Uranotaenia garnhami* sp. n. Posterior end of larval abdomen. Pecten scales (*a*) and comb scales (*b*) enlarged.

Differs from *shillitonis* as follows :

Head : Antennal hair single or divided into 3–4 branches distally. Seta A with 7–8 simple branches, *d* with 4–7 simple branches which are about ½ the length of B, *f* with 3–4 branches ; mentum with 6 teeth on either side of the large central tooth. *Abdomen :* Comb a row of 5–12 long but weakly sclerotized scales. Siphon cylindrical, slightly tapered at apex, with an index of 2 in uncrushed whole larvae ; pecten reaches to just over a ½ and is composed of 11–16 pale spines which have many fine ventral denticles, which are often continued round the tip to the upper half of the dorsal side or for full length dorsally ; subventral tuft at two-thirds, short, and with 5–8 simple branches. Saddle weakly sclerotised, incomplete, and with a few spines on distal border ; lateral seta usually 2-branched but one specimen has the lateral seta 3-branched on one side ; upper and lower caudal seta with 2–5 branches, lower usually 2-branched.

Described from holotype, 1 male paratype, their larval and pupal pelts and a few whole larvae from Kigezi 8000 ft., Uganda, collected by *Dr. P. C. C. Garnham*, and a few whole larvae from Kizimba and Kakuka 7–8000 ft., North Spur, Ruwenzori, Uganda, collected by *Dr. A. J. Haddow*.

Field Notes.—The larvae were collected from bored bamboos and were found together with the larvae of *U. shillitonis*.

Ficalbia (Etorleptiomyia) xanthozona sp. n.

This species is readily distinguished from the only other Ethiopian *Etorleptiomyia*, *Ficalbia mediolineata* Theobald, by the broad basal yellow bands on the abdominal tergites and by the tarsal banding.

Female.—Head: Vertex clothed with narrow golden-yellow decumbent and creamy white upright scales. Tori yellow, darkened on inner surface, and covered with small, broad, golden-yellow scales internally; first flagellar segment with a few golden scales above at base and very little longer than second segment. Palpi about $\frac{1}{4}$ the length of the proboscis, dark and with a few yellow scales at tip. Proboscis dark, with a broad yellow band in the middle, and a patch of yellow scales at the tip above. *Thorax:* Integument of scutum dark brown and covered with narrow golden-yellow and dark brown scales which form an indefinite pattern as follows: Two fairly large patches of brown scales on either side, one at scutal angle and the other in front of supra-alar bristles, a short median line of brown scales posteriorly which reaches to about the middle of the scutum; two very short indistinct lateral posterior brown lines. Lateral lobes of the scutellum covered with broad yellow scales, mid lobe with some broad brown scales in middle basally, rest yellow; *apn* with broad yellow scales below, dark brown ones in the middle, and narrow yellow ones above; *ppn* with narrow brown scales and a very few broad yellow ones below; post-spiracular area with small broad yellow scales; all coxae with a spot of broad yellow scales above and below, black ones in the middle. *Legs:* Dark brown with yellow bands, all dark areas with a variable amount of yellow mottling. Fore femora with narrow basal and apical and broad sub-basal and sub-apical yellow bands; mid and hind femora with the anterior surface dark, with a broad sub-basal yellow patch and a narrow sub-apical and apical yellow band; posterior surface mainly yellow basally, banded apically. All tibiae mottled brown and yellow with indications of a pale line below, most distinct on middle tibiae, and with broad sub-apical and narrow apical yellow bands. All tarsi with yellow bands at the base, middle, and apex of the first segment, and segments 2–5 with basal and apical yellow bands; fifth segment rather variable and may be all pale or half pale and half dark. *Abdomen:* Dark brown above with broad basal yellow bands on tergites 2–8; sternites yellow with narrow dark apical bands and a few black scales medianly on each segment. *Wing* scales broad. Costa all dark, but other veins with a variable number of yellow scales tending to form spots, especially on the 5th and 6th veins; stem of upper fork vein mainly dark.

Male unknown.

Described from allotype, collected at Mongiro, Bwamba County, Toro District, Uganda, April, 1944.

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1948

WEDNESDAY, November 3
,, December 1

1949

Wednesday, January 19 (Annual Meeting)
,, February 2

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